

University of Information Technology and Sciences
Faculty of Science and Engineering
Department of EEE, IT and CSE
Midterm Examination, Autumn- 2024
Course Title: Differential and Integral Calculus
Course Code: MATH 0541163/ MATH 05411101/ MATH 0541111

Marks: 20

Time: 1 hour

Answer all the questions

1. (a) Define even function and odd function. Test whether the following functions are even or odd. [4]
- (i) $f(x) = \ln(x + \sqrt{1 + x^2})$
- (ii) $f(x) = \frac{2|x| - x^4}{2\sin^2 x}$
- (b) Sketch the graph of the following functions. Also find domain and range of the following functions. [4]
- (i) $f(x) = 3 + \sqrt{x-1}$ (ii) $f(x) = 5 + |x - 8|$
- (c) If $f(x) = \tan^2 x$, $g(x) = \frac{1}{\sqrt{x}}$ and $h(x) = x^3$, find $(f \circ g \circ h)(x)$. [2]
2. Find the first order derivatives of the following functions: [10]
- (i) $y = \sin^2 \sqrt{1 + \cos 3x}$ (ii) $y = \sqrt{x} \tan^3(\sqrt{x})$
- (iii) $y = [1 + x^2 \sin^3(x^5)]^{12}$ (iv) $\sin(x^2 y^2) = x$
- (v) $x^2 y + 3xy^3 - x = 3$